REMARKS

Claims 23-35 were examined. All claims were rejected. In response to the above-identified Office Action, Applicant amends claims 23, 25, 27, 31 and 33, and adds new claims 36 and 37, without introducing any new matter. Claims 25, 31 and 33 are amended to address issues noted by the Examiner. Support for the amendments to claims 23, 27 and 31 is at p. 7, lines 12-13; while support for the new claims is at p. 7, lines 1-24. Reconsideration of the rejected claims in light of the aforementioned amendments and the following remarks is requested.

I. Claims Rejected Under 35 U.S.C. § 112, First Paragraph

The Examiner rejected claims 25 and 31-35 under 35 U.S.C. § 112, first paragraph, for failing to comply with the enablement requirement. Applicants have amended claims 25, 31 and 33 to recite the appropriate number of metal lines and/or shift registers as noted by the Examiner. It is believed that the amended claims (and those that depend therefrom) are in compliance with 35 U.S.C. § 112, first paragraph, and so these rejections should be withdrawn.

II. Claims Rejected Under 35 U.S.C. § 103(a)

The Examiner rejected claims 23, 24 and 26-30 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,609,825 issued to Berger *et al.* ("*Berger*") in view of U.S. Patent Publication No. 2003/0193597 by Fossum *et al.* ("*Fossum*") and further in view of U.S. Patent No. 4,709,259 issued to Suzuki ("*Suzuki*") and U.S. Patent No. 5,541,645 issued to Davis ("*Davis*"). Applicants believe that the Examiner's reliance on *Suzuki* is misplaced, because *Suzuki*'s operational principle is incompatible with *Berger* and *Fossum*, and furthermore is different from the claimed device and system.

In *Suzuki*, a relatively complex color image sensor is described. Each "photoelectric conversion unit" is composed of an array of single pixel measuring units, where the array size is at least 3×3. The charge signal in each pixel of the same color within a photoelectric conversion unit is added to produce the signal for that color for the unit. Since each row of pixels (*not* conversion units) contains pixels of each of the three colors, *Suzuki*'s apparatus requires *three* metal lines between each pair of rows to carry "scan" signals, while the summation of charge signals means that another *three* metal lines between each pair of columns must carry the various color signals vertically to the edge of the array where they can be added. Thus, significantly more of the

sensor's physical structure is occupied by metal lines, instead of photosensitive components.

In addition to the structural differences between *Suzuki* and Applicants' claimed apparatus, the operational principles are quite different. As Applicants previously argued, *Suzuki* achieves its variable integration time by resetting all the pixels simultaneously and then by selectively reading all the red, all the green, and all the blue pixels after an appropriate interval. That the three colored subsets of the array are read separately is shown clearly by *Suzuki*'s figure 3: between t1 and t2, all the red pixels are read; between t3 and t4, all the green pixels are read; and between t5 and t6, all the blue pixels are read. The circuit structures appear to support overlapping or even simultaneous reads (indeed, figure 7 appears to support *only* simultaneous reads), but if two colors are read simultaneously, then *they could not have had different integration times.* This is because the integration always starts with the reset signal (t0 in figure 3).

Considering *Suzuki* from another perspective may help to illuminate the difference. After the reset signal, all its pixels begin integrating. Assume, for example, that in the image, red light is strongest, so the red integration time is the shortest. Thus, the red vertical scan shift register will be activated first, and photoelectric conversion unit values (summed pixels) for red, row 0, will begin to appear on the red output line 170c. After red row 0 is shifted out by the horizontal scan shift register, the red vertical scan shift register will advance, and red row 1 signals will begin to appear on the red output line. At this time, *no valid green or blue signals are present on lines 170a and 170b.* If, during the readout of red, green integration was completed, then the green vertical scan shift register would be activated. In the embodiments with independent horizontal scan shift registers, the timing of the green signal could be completely independent of the red signal, but in other embodiments, red and green pixels of the same column would appear on lines 170b and 170c in synchronization. However, the *row numbers* would be different, because the red vertical scan shift register started earlier. Thus, the readout of the red, green, and blue frames would be staggered in the time domain. The only way *Suzuki* can produce synchronized row data for each color is to use the same integration time for each color – thus causing the invention to fail its purpose of allowing variable integration times.

By contrast, in Applicants' method, all of the pixels of a row (regardless of color) are read when the wordline shift register is active. Since the *resets* of each color are done

separately, the *readout* of each color can occur at the same time while preserving the claimed independently set integration time.

In short, because claim 23 requires a wordline shift register having a plurality of outputs, each output being coupled to control a readout of *all* of the sensor elements that are in a respective one of the rows of the array, it contains material not taught or suggested by any of the references. For at least this reason, Applicants respectfully request that the rejection of claim 23 be withdrawn.

As to claims 24-26, those claims depend directly or indirectly upon claim 23, and are patentable for at least the reasons discussed in support of their base claim. The Examiner is requested to withdraw these rejections as well.

As to independent claims 27 and 31, those claims also require that the wordline shift register control the readout of *all* of the pixels in a row. As discussed above, although *Suzuki*'s apparatus can be operated in this mode, if it is so operated, the integration time for sensor elements of each color *cannot* differ, as the claims require. Therefore, Applicants respectfully request that the rejection of claims 27 and 31 be withdrawn.

Similarly, as to claims 28-30 and 32-35, those claims depend directly or indirectly upon claim 27 or claim 31, and are patentable for at least the reasons discussed in support of their base claim. The Examiner is requested to withdraw these rejections as well.

III. New Claims

Applicants add claims 36-37, which are supported by the specification, and which contain limitations not taught or suggested by the references of record. The claims describe another aspect of one embodiment, including the alternating color and alternating row arrangement, the separate reset registers for each color, and the single wordline shift register that reads each pixel in a row corresponding to each of the shift register's outputs. Accordingly, the Examiner is requested to allow these new claims.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending, namely claims 23-37, patentably define the subject invention over the prior art of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Examiner believes that a telephone conference would be useful in moving the application forward to allowance, the Examiner is encouraged to contact the undersigned at (310) 207-3800.

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Respectfully submitted,
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Lillian E. Rodriguez — December 21, 2004